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ARS 22-8
November 1954

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service

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QUESTIONS AND ANSWERS ON FOOT-AND-MOUTH DISEASE 1/

The Disease Itself

Q. What is foot-and-mouth disease?

A. A highly contagious vesicular disease (characterized by vesicles or blisters) affecting cloven-footed animals. Among farm animals are included cattle, swine, sheep, and goats; among wild animals, deer, elk, buffalo, antelope, moose, etc.

Q. Does it affect human beings?

A. Foot-and-mouth is not a human disease; it is a livestock disease. Farmers who have handled infected animals need not fear for their health. Neither is meat or milk from infected animals dangerous to humans. The only danger is that persons handling diseased animals can carry the disease mechanically on their hands, shoes, or clothes to other susceptible animals. Meat and milk are dangerous for the same reason--spreading the disease to other animals.

Q. What causes it?

A. A filtrable virus (a virus so small it passes through the finest porcelain filters). There are at least 6 recognized types of foot-and-mouth disease virus, and variants within these types. The virus remains infective for almost a year under favorable circumstances. It can be killed by high temperatures and by some disinfectants, but can remain dormant indefinitely when frozen.

Q. How can you determine what type of virus is present?

A. Only by serological tests, which must be made in a laboratory.

Q. What does the disease look like?

A. Visible symptoms appear first as blisters on such tissues as the tongue, lining of the mouth, and around the top of the hoof. In milk cows, the blisters may appear on the teats and udder. The

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1/ Information in this report was provided by the Animal Disease and Parasite Research Branch, the Animal Disease Eradication Branch, and the Animal Inspection and Quarantine Branch, Agricultural Research Service.

blisters soon break, leaving a raw eroded surface. In cattle there is excessive salivation, causing the animal to drool. When the feet are affected, the animal limps painfully or lies down.

Q. How can you be sure an outbreak is foot-and-mouth disease?

A. Thorough diagnostic tests are made by men trained in differential diagnosis of vesicular diseases (differentiation between vesicular diseases with similar or identical visible symptoms, such as foot-and-mouth disease, vesicular exanthema, and vesiculat stomatititis). The diagnosis is confirmed on the basis of scientific fact.

Incidence and Previous Experience

Q. What experience has the U.S. had with foot-and-mouth disease?

A. Nine outbreaks have occurred in this country: 1870, 1880, 1884, 1902, 1908, 1914, 1924 (twice), and 1929. The most widespread of these was the one in 1914 when the disease appeared in 22 States and the District of Columbia. In other outbreaks, the infection was confined to relatively small areas. The U.S. government worked close with Mexico to eradicate the disease there during the years 1947-52 and 1953-54. U.S. specialists were invited to observe the eradication program in Canada during the outbreak of 1952. Furthermore, U.S. scientists have worked and are working in a number of foreign laboratories on cooperative research programs on foot-and-mouth disease.

Q. Where does it occur in other parts of the world?

A. It is widespread in Europe, Asia, Africa, and South America. The major livestock-producing countries free of the disease (as of October 1954) are Australia, Canada, Ireland, New Zealand, Norway, and the United States.

Mortality and Economic Losses

Q. Does foot-and-mouth disease usually kill affected animals?

A. Mortality varies widely. Milder forms of the disease usually kill young animals only. More virulent forms have caused death losses in Europe of 30 to 50 percent of the affected animals.

Q. What are the main economic effects of the disease?

A. We can't afford to live with the disease because of the great damage that comes from loss in condition and permanent impairment such as loss of fertility. Recovered animals seldom regain production efficiency. Meat animals lose weight. (Sore mouths make it most difficult to eat, and many do not eat at all. Sore feet keep them from ranging to where feed is located. The latter is an especially important problem in range areas.) Dairy stock also lose condition rapidly and milk production often drops to almost nothing.

Q. What if the disease is a mild form?

A. It is just as important to eradicate mild forms of the disease as those that are more virulent. Often the disease does appear in mild form with atypical symptoms. Usually the disease gains in virulence as it spreads. For this reason we cannot afford to take any greater chances with mild forms than with virulent forms.

Q. How much will an outbreak cost?

A. There can be no definite answer until the extent and duration of an outbreak is determined. Direct costs of eradication can be accounted for as the work progresses in the form of indemnity payments and administrative costs. However, by far the greatest expense of an outbreak will be in indirect losses suffered as a result of quarantines and other interruptions to normal marketing, transportation, feeding, and slaughtering processes. The 1929 outbreak--the last in this country--cost $574,170 in direct expenses alone. Indirect costs cannot be estimated. The eradication campaign in Mexico since 1947 resulted in a net cost to the U.S. government through August 1954 of about $133,500,000, expended in the U.S. and in Mexico. It has been estimated that if the disease ever became firmly established in the United States it could cost the country up to one-fourth of its production of meat and other animal products.

Eradication Measures

Q. What measures are taken to stop the spread of the disease?

A. Eradication measures are built around a 4-point program that has proved successful in past outbreaks in this country: (1) Quarantine, (2) inspection, (3) slaughter, and (4) disinfection and testing.

(1) Quarantine

Q. How are quarantines imposed?

A. Some are imposed by State sanitary authorities and some by the Federal Government.

Q. What is the difference between the two kinds of quarantines?

A. State quarantines are imposed within State boundaries, on local premises, in counties, or other areas within a State. Federal quarantines control the movement of susceptible animals and products across State lines.

Q. Who enforces quarantines?

A. State quarantines are enforced by local authorities, such as city county, or State police, or by special deputies hired by local authorities. Federal quarantines are enforced by Federal inspectors.

Q. Who determines the extent of quarantines?

A. State and Federal officials cooperate in determining their extent.

Q. On what basis is the extent determined?

A. Quarantines are set up first over a wide enough area to be reasonably sure the quarantine line is outside the spread of infection. This means the first quarantines cover a relatively large area. When the exact extent of the spread is determined, quarantined areas may be reduced.

Q. What do quarantines do?

A. Quarantines are set up to protect farmers from further spread of the disease, and are designed to help rid the area of the disease as soon as possible. They limit the movement of animals, certain animal products and materials, and human beings in varying degrees, depending upon whether they affect an infected or exposed premise, quarantine zone, or buffer zone.

Q. How do quarantines affect exposed or infected premises?

A. Until infected and susceptible exposed animals are properly disposed of and disinfection has been completed, neither persons, vehicles, animals, nor products may move on or off exposed or infected premises without permission from proper authorities.

Authorized persons may move on and off the premises only after disinfection under the supervision of proper officials. Deliveries may be made to the premises under supervision.

Q. Why is it necessary to impose such strict quarantines, even prohibiting the movement of human beings?

A. Because foot-and-mouth disease is the most contagious of all animal diseases. In addition to being spread through contaminated feed, livestock handling facilities, and the like, the infection can be spread mechanically by human beings carrying the virus on their clothing, shoes, or hands as they move from an infected premise to other farms with susceptible animals.

Q. How do quarantines affect the entire area?

A. No susceptible animals may move out of the quarantine area. Movement of persons or vehicles are subject to rigid restriction to prevent the spread of infection. Specified animal products and materials such as meat, hay, and straw, may not move out of the quarantine area. All movement of animals is prohibited until thorough inspections have been made to determine the extent of the the infection. After the determination has been made, animals may be moved under permit. Creameries, cheese factories, etc., are

investigated and required to sterilize skim milk, buttermilk, and whey, as well as milk cans before returning them to farmers. These provisions are not necessary as a safeguard to human health, but as a protection against the further spread of the disease among livestock. The first quarantines are often strict until the exact area of infection and its seriousness can be determined. Quarantines can be relaxed as soon as it is safe to do so.

Q. How do quarantines affect buffer zones?

A. Buffer zones may be used in some areas where geographical and other considerations make it advisable. These buffer zones surround the quarantine zones as further protection against the spread of the disease. Animals and animal products may be moved within the buffer zone under restrictions. Movement of human beings and vehicles between the buffer zone and quarantine zone are under the same restrictions as from any other part of the country.

Q. Do quarantines affect the movement to market of farm products such as truck crops?

A. The whole quarantine system is so organized as to prevent any unnecessary delay in the movement of salable products not considered to be a means of transmitting the disease. However, no products may be moved from infected and known exposed premises until released by proper authorities. Hay, straw, and other similar kinds of forage that may be considered to be contaminated cannot be moved anywhere within or from the quarantine zone. Other crops, such as fruits and vegetables, will be allowed to move to market as soon as preliminary inspections have determined the extent of the infection within the quarantine zone, and proper officials authorize the movement.

Q. Can milk be shipped from dairy farms within the quarantine zone?

A. After it has been determined by thorough inspection that disease does not exist on a particular dairy farm within the quarantine zone, milk from such farms may be moved under permit to a processing plant within the quarantine zone for pasteurization and for use in the quarantine zone. It may not be moved out of the quarantine zone.

Q. Can milk be shipped from dairy farms within the buffer zone?

A. With the same restrictions as above, milk can be moved within the buffer zone, and, also under permit, into the quarantine zone. It cannot be marketed outside either the quarantine or buffer zone.

Q. Can milk be brought from outside the quarantine and buffer zones into either of these?

A. Yes, for consumption within such zones.

Q. Can such products as wheat or corn be moved out of the quarantine zone?

A. Yes, as long as the movement meets requirements set by the proper quarantine officials.

Q. Can such deliveries as feed and fuel be made to farms where the disease exists?

A. Yes, but under supervision of proper officials.

Q. Can artificial breeding associations be operated within the quarantine zone?

A. Not likely. It has been found that the semen of infected bulls carry the virus of foot-and-mouth disease. Semen could be brought into the quarantine zone from associations outside whose bulls are known to be healthy.

(2) Inspection

Q. How is inspection carried out?

A. By qualified veterinarians who inspect susceptible animals to detect immediately any further spread of the disease.

(3) Slaughter

Q. How are slaughter operations carried out?

A. Infected and exposed animals usually are slaughtered and buried on the home premises. Carcasses are buried deep enough to prevent scavenger animals from digging down to them and special measures are taken to hasten decomposition.

(4) Disinfection and Testing

Q. How are disinfection and testing carried out?

A. After slaughter operations are completed, contaminated premises are thoroughly cleaned and disinfected according to prescribed methods. Later, susceptible test animals are placed on the premises and repeatedly inspected for a period determined according to existing circumstances. If the test animals show no evidence of the disease at the end of the prescribed period, the premises are released from quarantine for restocking by the owner.

Treatment and Cures

Q. Why not treat and cure the disease rather than use the slaughter method?

A. There is no recognized cure for foot-and-mouth disease. Treatments can only alleviate the symptoms. They do not prevent the

spread of the virus and thus make eradication of the disease even more difficult. Experience has shown that in dealing with this most contagious of all animal diseases it is less costly to move in quickly with a slaughter program and wipe out the infection before it becomes firmly established. The slaughter of the few protects the many.

Q. Do all countries use the same measures to combat the disease?

A. No. In many countries of Europe, Asia, and South America, the disease has been established for so many years that a slaughter program is considered economically impractical. In the lesser developed of these countries, foot-and-mouth disease is allowed to run its course unchecked. Other countries attempt to control the disease and live with it. But all countries that eradicate the disease when it strikes do so by a slaughter and quarantine method similar to that used in the United States.

Use of Vaccines

Q. Is vaccination ever used against foot-and-mouth disease?

A. Yes, by some countries. But no country has ever eradicated the disease by vaccination alone. It is generally used only as a means of control.

Q. Have vaccines proved successful where they have been used?

A. The value of vaccines now in use has never been specifically determined. At best, they are considered useful only when the infection spreads so widely that quick eradication is out of the question. Vaccines can develop a degree of immunity in susceptible animals, but how long the immunity can last and what degree of exposure it can withstand are still subjects for further research. It has been determined that vaccination against one virus type will not provide immunity against other types. In Europe, where vaccination is used, vaccines have had to be changed frequently when new types of virus have appeared several times during a single outbreak. Furthermore, the use of vaccines merely adds to the expense of operations and lengthens the effort if the disease is being eradicated. Disease fighters are never sure whether the infection is actually wiped out or whether vaccines have built up immunity that is masking the virus, lying ready to infect susceptible animals again and again.

Q. Why was vaccination used during the outbreak in Mexico in 1947-52?

A. The disease got a secure foothold before adequate eradication measures were started. Even though limited to central Mexico, the disease became so widespread in the region that full-scale eradication by slaughter threatened to upset the economic balance of the country. In addition to providing food and other products, cattle are used in Mexico as work animals, and the agriculture of

the country might have been seriously damaged if more and more animals had continued to be exposed, infected, and slaughtered. It was determined that vaccination should be added to the eradication measures in an effort to reduce the rapid spread of infection. At the same time, slaughter of all infected and exposed animals was continued wherever infection appeared.

Q. Will vaccination be used during an outbreak in the U.S.?

A. No. Not unless the infection gets out of control and spreads widely on a nationwide basis.

Q. If the disease did spread that widely, would vaccines be available?

A. Yes, within a reasonably short time after a decision was reached to use them. We do not produce such vaccines now, but we could do it quickly if necessary.

Indemnities

Q. Will farmers be paid for animals that are slaughtered?

A. Yes. After the Secretary of Agriculture declares a state of emergency because of the existence of foot-and-mouth disease the Department invites the various affected States to cooperate in the control and eradication of the disease. When the authorities of a State agree to enforce proper quarantine and eradication measures, and to pay 50 percent of the costs of indemnities and disinfection, then the Department can pay the remaining 50 percent. If the State pays less than half the costs, the Department can pay no more than equal that amount. (See B.A.I. ORDER 376.)

Q. Who decides the value of condemned animals?

A. Appraisers representing State and Federal Governments, working jointly, appraise animals to be slaughtered according to market values as meat, dairy, or breeding animals. The owner signs an agreement on appraised values. Owners cannot be paid for loss of income.

Q. What happens if the owner doesn't agree with the appraisers?

A. He has recourse through the courts, after the animals are slaughtered.

Q. How will the owner be paid for highly valued breeding animals?

A. Appraisals are made on their real value as breeding animals. But payments to owners are limited to not more than three times the meat or dairy value of the animals.

Q. What about other losses sustained as a result of a campaign?

A. If condemned products and facilities such as hay, straw, and portions of livestock housing facilities must be destroyed, the owner is paid for his loss.

Effect of the Outbreak on the Vicinity

Q. What can farmers do?

A. Infected farms will be under enforced quarantines, but other farmers can keep visitors off their premises. The farmer on noninfected premises should: (1) Prevent stray animals from coming in contact with his own livestock or into areas where they are kept. (2) Introduce new animals only on advice of veterinary officials. (3) Provide a means for deliveries of feed and other products so that vehicles which might have been on other farms do not have to come on his premises, and particularly not into areas where his animals are kept. (4) Watch livestock carefully for symptoms resembling foot-and-mouth disease.

Q. What should a farmer do if he finds symptoms of foot-and-mouth disease?

A. Report the fact immediately to one of these: Eradication headquarters in the community, the U.S. Department of Agriculture inspector in charge, the State veterinarian, or his practicing veterinarian. Set up his own quarantine until the proper authorities arrive to take charge and make a proper diagnosis.

Q. What can residents of an urban community do to help in a campaign?

A. Don't travel in the quarantine zone unless absolutely necessary. Particularly, stay away from premises on which livestock are kept. Comply fully with disinfection and quarantine requirements. Don't repeat unconfirmed rumors.

Q. Will a community suffer food shortages because of the disease or quarantines?

A. No. Quarantines will not interfere seriously with supplies of milk, meat, and other foods. There is no reason to expect food shortages.

Q. How long will quarantines be in effect?

A. That depends on how long the infection persists. Quarantines will remain in effect until it can be determined that the disease has been eradicated. All restrictions will be removed as soon as it is safe to do so.